

Group 2 / IIA; Alkaline Earth Metals Group

Calcium (Ca) and magnesium (Mg) are ubiquitous; the rest is rarer; Radium is radioactive and thus only found in radioactive decay chains. Altogether the earth alkali metals account for about 4 % of the crust of the earth. Like the [alkali metals](#) they are very reactive and thus never found in the elemental state.

All are silvery-shining metals that oxidize immediately in air. Stable oxide layers, however, protect some of beryllium (Be) and magnesium (Mg) so they can be used in their metallic state and are stable in water (which dissolves the others)

Magnesium (Mg), calcium (Ca) are technically important (not to mention the [biological](#) importance of calcium). The rest also finds special uses.

Table of Basic Data

| Name (German) | Beryllium <i>Beryllium</i> | Magnesium <i>Magnesium</i> | Calcium <i>Calcium</i> | Strontium <i>Strontium</i> | Barium <i>Barium</i> | Radium <i>Radium</i> |
|--|-------------------------------|-------------------------------|---------------------------|---------------------------------|-------------------------|-------------------------|
| Atomic number | 4 | 12 | 20 | 38 | 56 | 88 |
| Atomic mass [u] | 9,01 | 24,31 | 40,08 | 87,62 | 137,33 | 226,03 |
| Melting point [K] | 1551 | 921,95 | 1112 | 1042 | 998 | 973 |
| Melting point [°C] | 1278 | 648,95 | 839 | 769 | 725 | 700 |
| Melting point [°F] | 2332 | 1200 | 1542 | 1416 | 1337 | 1292 |
| Boiling point [K] | 3243 | 1380 | 1760 | 1657 | 1913 | 1413 |
| Density [g/cm ³] | 1,85 | 1,74 | 1,54 | 2,63 | 3,65 | 5,50 |
| Ionization energy [eV] | 9,32 | 7,65 | 6,11 | 5,70 | 5,21 | 5,28 |
| Electro-negativity | 1,5 | 1,2 | 1,0 | 1,0 | 1,0 | 1,0 |
| Atomic radius [pm] | 113,3 | 160 | 197,3 | 215,1 | 217,3 | 223 |
| Ionic radius [pm] | 34 | 78 | 106 | 127 | 143 | 152 |
| Oxidation numbers | 2 | 2 | 2 | 2 | 2 | 2 |
| lattice typ Transformation temp. [°C] | hcp | hex | hcp 440 fcc | bcc 540 hcp 234 fcc | bcc | ? |
| Lattice constant [Å] (a or c) | 2,29 | 3,20 | 5,56 ? | 6,09 ? | 5,02 | ? |
| Young's - Modul us [GPa] | 310 | 44,3 | 19,6 | 15,7 | 12,7 | ? |

| | | | | | | |
|--|------|----|----|---|----|---|
| Therm. expansion coefficient α [$10^{-6}K^{-1}$] | 11,5 | 26 | 22 | ? | 19 | ? |
|--|------|----|----|---|----|---|

- In case of doubt all numbers are for room temperatures
- fcc = [face centered cubic](#); lattice const. = a
- bcc = [body centered cubic](#)
- sc = [simple cubic](#)
- hp = simple [hexagonal](#)
- hcp = [hexagonal close packed](#); lattice constants a and c.
- op = [simple orthorhombic](#), [monoclinic](#), [triclinic](#)
- tp = [simple tetragonal](#)
- dia = [diamond structure](#)
- r = [trigonal](#) or rhomboedral trigonal